

23 APRIL 1982 Vol 1 No 1

30p

Space Amaze on ZX 81

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How to submit articles
Articles which are submitted for publication should not be more than 2 000 words long

If you are writing for a particular section such as Programming you should try to cover the ground in about 1 000 words

All submissions should be typed and a double space should be left between each line

Programs should whenever possible be computer printed

We cannot guarantee to return every submitted article *Popular Computing Weekly* can accept no responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week



Editorial

IT IS now almost most certain that a new Sinclair computer will be launched before the summer, or very shortly after

This will be an exciting development which could cement Clive Sinclair s prominent position in the home computer market So far he has looked rather vulnerable to competition from the multinationals

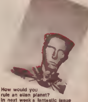
As we report in our News section, Clive s new computer — the Spectrum — will probably cost about £170 come with 32K of memory and have full sound and colour

We do not yet know how far the version of Basic used in the computer will be compatible with the ZX81

It is important that Clive should make every effort to ensure that ZX81 programs, written in either Basic or machine code, should be able to run without significant alteration on the new computer

If the ZX81 were to be rendered obsolete it would be a great blow to all of those people who have recently bought this model

Next Week



How would you rule an alien planet? In next week s fantastic issue the program that tells you how– .

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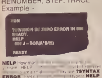
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STACK

COMMODORE VIC DEALER FOR DETAILS OF STACKS VIC PERIPHERALS

The ZX82 is near!

CLIVE SINCLAIR is on the brink of launching his new computer. The machine will probably be sold under the trade name 'Spectrum' but for the moment is code-named 'zx82' within Sinclair Research.

The price of the ZX82 is expected to be about £170 — considerably higher than the ZX81 (£69.95) or the ZX80 (£99). But its features should prove well worth the money and will make it a serious contender for the Number 1 computer for home users.

The ZX82 is a significant step forward from the ZX81. It will offer colour graphics, and have a mechanical keyboard with feel similar to a typewriter. The touchpad keyboard of the ZX81 proved a cause for complaint for many users but the new design should put an end to these dissatisfactions.

The memory of the ZX82 will be capable of expansion to 32K — seen by many users as necessary, rather than merely desirable.

Compatibility with earlier Sinclair machines has yet to be confirmed.

Third ZX Microfair promises to be biggest yet, says organiser

The third ZX Microfair will be held at Westminster Central Hall on Friday April 30 and Saturday May 1.

More than 70 suppliers of hardware and software for the Sinclair ZX computers have taken stands at the show, according to the organiser Mike Johnston.

'We're having great difficulty in squeezing in everybody who wants to show their wares in,' said Johnston. 'But we will be making more space available than at previous Microfairs, so visitors will be able to see a very wide range of offerings.'

About 40% of the exhibitors will be showing hardware products including a number of high quality RAM packs. Storkrose will be demonstrating an I/O device which allows up to four cassettes and a printer to be attached to the ZX81 while Ab Pandall will show a mini keyboard to fit over the XZ81.

Mike Johnson: more space

Admission will be 60p for adults and 40p for children, and the exhibition will be open from 12.30 pm to 8.30 pm on the first day and from 10.00 am to 6.00 pm on the second.

For those who wish to make absolutely sure that they will get in, advance tickets are available for the Friday, price £1 for adults and 50p for children. You can obtain these from Mike Johnston, Organiser, ZX Microfair, 71 Park Lane, London N18 0HG.

Johnston is also organising a ZX Microfair to be held in Manchester on Saturday May 29 and Sunday May 30 at the New Century Hall in Corporation Street.

Times of opening are 10.00 am to 8.00 pm on the first day and 10.00 am to 5.00 pm on the second.

Monolith plans a £200 disc drive for Sinclairs

At last you'll able to use disc memory with the ZX81 when Monolith launches a floppy disc unit for the Sinclair machine probably in June.

The units will cost about £200 each according to Monolith director Rod Hallett. He believes they will prove attractive to hobbyists and small business users such as shopkeepers who could use the drives for applications like stock control and accounting.

The drives are at present undergoing final tests, but Hallett is confident that they will be completely bug free by the time of the launch.

'We are already taking orders on a deposit basis but as yet we haven't decided whether to make the devices available through dealers,' said Hallett. 'But because we're selling on fairly tight profit margins to keep the price down, we're likely to plump for direct mail sales only.'

How Sinclair will react to the new machines is still unclear. 'Sinclair does not intend to recommend any particular disc drive,' said a spokesman for the company. 'We are interested in selling a drive under our own brand name, either making it ourselves or buying in from another supplier. We've had a number of discussions about this with companies including Rudime, but as yet have come to no decision about these.'

Commodore is having a baby

Rumours have been filtering through the press lately with regard to new machines coming out of the Commodore factories. Lets take a look at the newest, and smallest, of these, the Ultimax.

Ultimax has a US selling price of $149.95 so we can expect a UK price of something like £99. Delivery dates are not quite so clear: some dealers are quoting mid-summer, but from past experience we shouldn't expect any great quantities until somewhere nearer Christmas.

Built in memory will be 2K or 2.5K (no-one seems quite sure at the moment), with an additional 8K expansion cartridge becoming available at some point. However, as only one cartridge can be plugged in at a time, and Basic comes on — you guessed it — a plug-in cartridge, memory expansion seems a lost cause.

All this is still subject to change, so things may be different when the machine appears in large quantities.

See us at the Computer Fair

The first of the major home computer exhibitions this year is the Computer Fair, running at London's Earls Court on April 23-25.

Popular Computing Weekly will be exhibiting at the fair on stands 309 and 410.

The Computer Fair is an ambitious attempt by IPC, the large publishing company, to break into the market for home computer exhibitions. To date this has been dominated by the Personal Computer World Show, held in the autumn.

One of the key attractions of the Computer Fair is the ZX Village in which most of the companies supplying software and hardware add-ons for the ZX81 will be exhibiting.

In a jam? The BBC can help you get unstuck

***David Kelly** looks at the BBC Referral Service for micro users*

THE BBC Computer Referral Service has been set up as an information exchange to put you in touch with someone who can give you an answer to seemingly insoluble problems about your micro

The popular BBC tv series *The Computer Programme* is only one aspect of an ambitious scheme to provide assistance to microcomputer users The whole scheme goes by the title *The BBC computer literacy project*, and includes the BBC micro a book, a software library a 30-hour Basic 'flexicourse specially designed for the BBC by the National Extension College and most important, the Referral Service to put interested groups and individuals in touch with each other

The Referral Service will make it possible for those whose interest has been fired by the tv programmes or the book to follow them up and learn more

Broadcasting Support Services handle the day-to-day running of the service Broadcasting Support Services is a charity funded by the BBC, and located in West London Set up originally as a back-up facility for the *On the Move* adult literacy series it now provides support for a wide range of BBC programmes

A mountain of inquiries

The Referral Service has been up and running since January this year, and staff at Broadcasting Support Services have been busy sorting through a mountain of over 75 000 inquiries that the Computer Literacy Project has so far received Each inquiry is referred for help to the nearest and most relevant of more than one thousand referral points dotted all over the country.

These referral points offer many different facilities Any group offering advice can be listed on the system as a micro help centre The only conditions asked of those on the list are that the service provided is independent of suppliers and that the advice given is impartial

A print-out goes to each inquirer

Of the 1163 referral points currently on the list, some 500 are colleges offering teaching facilities — many run the 30-hour National Extension College flexicourse in Basic, designed for use with the BBC micro

About 50 of the referral points are the approved service outlets for BBC micro advice, and the remainder are clubs and user groups Included on the list are the British Computer Society (BCS) clubs the Amateur Computer Clubs and about half of the 30 or so Computer Town UKs

The Referral Service is not limited to providing information about the BBC micro The referral points will give information about all aspects of microcomputing, and can give advice on any system in existence

In fact, they have only one thing in common — their desire to help One of the referral points is a fruit farm in Spalding that opens its doors to anyone who wants a go on its micro

Unfortunately many referral points which have sought to obtain a BBC micro have still not been able to do so, despite being placed on a 'priority list

So what happens when you write to the Referral Service How can your letter — one of 500 that week — receive a reply within 10 days?

You guessed it — the system has been computerised

All the referral points are stored on a computer master file Details of each letter received are entered in code, giving the name and geographical location of the sender and the information requested

Key codes by subject will provide information about such matters as courses for beginners, computer clubs in the vicinity of the inquirer, or the location of the nearest BCS club

The computer then produces, for every inquiry, a print-out listing the relevant referral points in the inquirer s area Each referral point is listed by name, location, contact name, address and phone number, together with details of what facilities are offered In the case of clubs, details of meetings are also given

A typical entry might include such details as shown in the illustration

Wide range of information

In addition to the print-out the inquirer is sent a list of national clubs and — where appropriate — information on computer careers and on micros for small businesses Leaflets about the use of micros in the construction industry and legal profession are in preparation together with a short bibliography The Amateur Computer Club and Computer Town UK organisations hope to produce leaflets on how to set up a club or 'Town

The BBC Referral System has been in business for three months, and already has over 1000 referral points So if you think your group could be a referral point, or if you wish to make additions or corrections to the BBC information, write enclosing a 12ins x 9ins stamped addressed envelope to *BBC Computer Referral Service Broadcasting Support Services, PO Box 7 London W3 6XJ* ■

Write to Club Reports, *Popular Computing Weekly* Hobhouse Court 19 Whitcomb Street London WC2 7HF, with details of successes you have had with your club with ideas for helping clubs along and with any news of special meetings We look forward to hearing from you

Space Amaze

How to play this amazing space invaders game invented by Dave Middleton.

IN THE DEPTHS of space surrounding the interstellar shipping lanes of the planet Urth a besperate bettle is being fought The shipping lanes must be kept clear of space mines being dropped by the evil Zexions

You duty as a space rookie is to attack the Zexion ship which is laying mines in your quadrant of space

The Zexion ship cannot be destroyed, but if you can ram the alien before the mine can be released then it will drop back into hyperspace and appear at another position in your quadrant Just before the mine is released the Zexion ship changes shape giving you a chance to avoid the mine

Your cruiser can withstand the impact of three space mines before you have to return to Urth for a refit Promotion is in order depending on your skill at harassing the Zexion

The Zexions are lazy, but as you ram the ship they tend to become more active and you will get less time to approach before the mine is released If you disturb the Zexions enough they get annoyed and scatter five mines without dropping from hyperspace, but this tires them so they slow down again

To control your cruiser press the cursor keys and the ship will move in the direction indicated Your cruiser is programmed to remain in your assigned quadrant

The program

Space Amaze uses an array to hold information about the contents of the screen An array element can have three states 0 indicating unoccupied, 1 occupied by a mine and 2 occupied by the alien ship The current position of the alien ship is given by ax and ay

Your ship is controlled by the ZX81 cursor control keys To enable the ship to continue moving even when a key has not been pressed, the variable d$ is used (lines 520-545) When



a legal key is pressed d$ changes state, but only if the ship is not at the edge of the screen (lines 550-580)

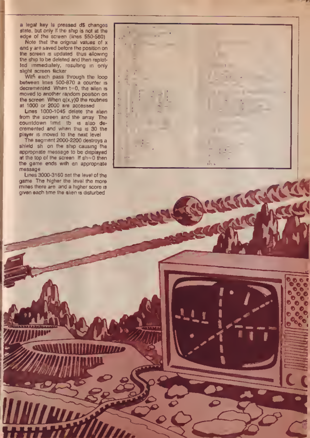
Note that the original values of x and y are saved before the position on the screen is updated thus allowing the ship to be deleted and then replotted immediately, resulting in only slight screen flicker

With each pass through the loop between lines 500-870 a counter is decremented When t=0, the alien is moved to another random position on the screen When q(x,y)0 the routines at 1000 or 2000 are accessed

Lines 1000-1045 delete the alien from the screen and the array The countdown limit tb is also decremented and when this is 30 the player is moved to the next level

The segment 2000-2200 destroys a shield sh on the ship causing the appropriate message to be displayed at the top of the screen If sh=0 then the game ends with an appropriate message

Lines 3000-3160 set the level of the game The higher the level the more mines there are and a higher score is given each time the alien is disturbed



Reviews
software

Canyon Fighter

The Vic Centre, 154 Victoria Road, London W5
Cassette price £5.95.

This is one of many games programs for the Commodore Vic 20 on the market at present.

The basic idea of the game is a simple one: you are the pilot of a spaceship making its way down a canyon with the ability to steer left and right as it snakes along its path.

To make life more hazardous various 'enemies' put in an appearance from time to time, with increasing regularity as the game progresses.

To aid you in your battle through the canyon, you have a laser which can be used to destroy the enemy craft, and any debris that gets in your way.

However, your laser is not powerful enough to penetrate the walls of the canyon, as you discover when you crash into it, still frantically trying to fire!

The game gets more and more difficult the longer it goes on, until it becomes virtually impossible to get through the canyon, as the walls close in on you the further down you go.

There are 10 levels of play and, as you might guess, the higher the level, the harder it is to play. The walls seem narrower, more enemies keep on appearing, more space debris gets in the way and the whole thing generally becomes more chaotic.

It is a way of getting high scores however!

As in most games of this nature it is decidedly simple to play, but correspondingly difficult to master. Only three keys control movement and firing but as the game gets more difficult you still seem to run out of fingers. (As a general plea to games writers, don't write games which require six fingers to operate!)

Moreover unlike games like Invaders, where a pattern soon becomes recognised and you learn how to build up a very high score without really thinking about it, Canyon Fighter does not repeat itself, and you have to keep your attention on the game all the time.

Consequently, generating enormous scores is not that easy and at no point do you know what is going to happen to your spaceship next.

Summary
It's good to see a program actually making use of the powers of the machine it's written for. Needless to say, it also makes excellent use of the Vic's colour and sound capabilities.

The only complaint is the inevitable one documentation. The user must discover for himself which keys perform what action.

Peek, Poke, byte and RAM!

By Ian Stewart and Robin Jones, published by Shiva Publishing, 110 pages paperback price £4.95

There are many, many folk around who buy a Sinclair ZX81 with great enthusiasm and then get stuck on how to use it. The manual is very good in comparison with most — but is still a struggle for the real novice.

The user groups and magazine articles give great help — but almost entirely for those who have some knowledge. The hundreds of adverts scream 'what you've been waiting for' but their wares can do no more than amuse the beginner.

In fact the number of books aimed at the ZX user is now well over 50 — but most of those claiming to be designed for the beginner are poorly presented and/or not very well written.

This book is a glorious exception.

What it does is take the reader gently but meaningfully through the material covered in the manual. The jokes begin right from the start — with a picture of Richard Baker on screen saying, 'No, you've left it tuned to BBC 1.' From then on the pages are littered with useful comment and relevant little programs.

Finally, this is a *real* book — properly printed and bound. The cover is by John Harris, the same artist (and the same theme) as used by Sinclair themselves.

I have only one quibble with this otherwise outstanding introduction to ZX81 programming — that the character "phi" is used for zero. Trivial, I know, but it jars on the beginner.

Summary
Far and away the best book for ZX81 users new to computing.

French Countdown

Published by AVC Software, PO Box 415, Birmingham 17
ZX81 16K, Cassette price £3.00

This is a recent addition to AVC's *Countdown* series of ZX81 educational games and is a great way to mug up on those hated French lessons.

As published, any child who has done French for a few months or more could use it. No doubt I shouldn't say this, but it is simple, if tedious, to change the vocabulary tested to suit the older child's needs.

The stored data comprises pairs of English/French words and phrases for translation. There are three banks of 20 such pairs — nouns, verbs, adjectives.

During each run the victim is invited to select any of these, or a mixture. He or she will then be asked to translate a randomly accessed set of 10, in a randomly chosen direction.

If the input answer is correct that question will not be repeated. If it is not, it may be — and the correct version is printed out.

A bit of fun is added by the 'countdown' approach. With each new correct answer a further stage of a rocket is built up on a launchpad. When you get 10 correct answers in a row the rocket takes off, quite spectacularly too.

This program is fully mug-trapped and throughout has a very pleasing screen display.

Other programs in the series test in a similar way, multiplication tables, English similes, and O-level physics problems.

Summary
A very well-designed ZX81 program that meets its aims enjoyably.

Reviews
hardware



ZX81 Joysticks

Micro Gen, 24 Agar Crescent Bracknell, Berkshire
Price £9.60 each, controller board £19.80 includes VAT and postage

Micro Gen has produced a set of joysticks with which games can be played at a greater speed than using the keyboard Each joystick produces a number between 30 and 114 at the middle range of an adjustable control mounted on the controller board

The whole set up requires no soldering as the joysticks plug into the controller board and the controller board plugs into the ZX81

It also provides a place to connect the Sinclair Printer or 16K RAM pack or whatever else you want to attach

All the connections to the joystick port including all the integrated circuits, are mounted to the left of the connections between the RAM pack and the ZX81

It is not possible to use this board on a ZX80, even with the 8K ROM as it requires the use of the ROM chip select connection which only appears on the ZX81

The ICs make up a seven-bit analogue to digital converter (A/D), which can be switched between the four analogue inputs from the joysticks The four inputs are

- 0 Joystick 1, UP/DOWN
- 1 Joystick 1, LEFT RIGHT
- 2 Joystick 2, UP/DOWN
- 3 Joystick 2 LEFT/RIGHT

The numbers given are Poked into the port location 16000, which is in the memory map (the same place as the RAM is stored) This selects which control you want to look at

The result is obtained by either Peeking at the same location or if using machine code by waiting 0.5 milliseconds and then loading the result into a register A fire button is included which operates bit 7 (adding 128 if Peeked) when pressed

Micro Gen is looking for programs to add to the ZX invaders and Maze program which use the joysticks

The board is quite stable in use and eliminates some of the wobble caused by using the keyboard The joysticks plug into two connectors on the side of the board and are then locked into place

The cable connecting them to the board is six feet long, so there should be no eye strain Although it is expensive the controller board can also be used as a four-channel A/D

Summary
This is an easy-to-use system which can be used in machine code (recommended for speed) or Basic



Vic Light Pen

Stack Computer Services, 290-298 Derby Road, Liverpool 20
Price £28.75 inc VAT

The pen connects to the control port on the right-hand side of the Vic The flexible wire from the port to the pen itself is long enough for the tv or monitor to be placed a number of feet away from the Vic

The position of the light pen is detected by looking at registers 36860 (X co-ordinate) and 36871 (Y co-ordinate) This gives you an effective resolution on the screen of approaching 90 by 90

For more efficient use of the pen this needs to be reduced to the Vic's own resolution of 22 by 23 which can easily be accomplished by a line or two of Basic

Thus from software you can detect the position of the pen on the screen and scale your response accordingly

The light pen would probably be of most use in a question and answer application, where the user is required to input an answer on the screen

Summary
Many users will not have encountered a microcomputer before, and will perhaps be reluctant to actually 'touch' the keyboard This light pen gives the opportunity for getting around that problem

The Devil's DP Dictionary

By Stan Kelly-Bootle published by McGraw-Hill, 141 pages paperback price £3.95

Let's start by having a look at one of the dictionary's definitions

DP dictionary *n* — An attempt to freeze the volatile vocabulary of an illiterate industry This work is the first such to succeed

It was thoughtful of Stan Kelly-Bootle to include a definition of his own work It almost makes my task as a reviewer redundant

As you may have gathered, this dictionary is not a serious attempt to provide an explanation of the curious words and phrases that abound in computing In fact it's the reverse With this delightful book on your bedside table your laughter will keep your partner awake for hours

But paradoxically there is a serious side to the dictionary It pokes fun at all sectors of the computing industry, from IBM — 'Irish Business Machines — to the consultant — from *con* "to defraud, dupe, swindle or, possibly French *con* (vulgar) 'a person of little merit' + *sult* elliptical form of 'insult

In pricking a few egos like this, the book offers important messages for people in all sectors of the industry

Here are a few more extracts to keep you amused

binary *adj* — Relating to a number system introdubed to protect children from parental help during maths homework assignments

mendacity sequence *n* – The basic sequence in ascending order, is lies, damn lies statistics, damn statistics, benchmarks, delivery promises

Summary
An unbeatable book to relax with that also provides much food for thought

Open Forum

OPEN FORUM is for you to publish your programs and ideas. It is important that you make sure your programs are bug-free before you send them in. We cannot test all of them.

As far as possible always send us a computer printed listing, made immediately after you have run the program.

Each program should include a description of what the program does, how to use it and how the program has been written.

Your contributions should be sent to Open Forum, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF with a stamped addressed envelope. We will pay £10 for each contribution published.

Pixel drawer *ZX81*

We've tried to keep this program short as possible to allow the maximum memory space for the actual picture. The cursor is steady when it is drawing, and flashing when it's not.

Pressing 0 switches from 'plot' to 'don't plot' and back. When the program is run, you enter the X and Y plotting co-ordinates you want to start from.

Pixel drawer
by Phil Garratt

```
10 INPUT
20 INPUT ,
30 LET F=1
40 LET A=CODE INKEY$-28
50 IF F=0 THEN UNPLOT · ,
60 GOSUB 100
70 PLOT X,Y
80 IF A=0 THEN LET F=SGN ABS  F-1
90 GOTO 40
100 LET Y=Y+(A=8 OR A=1 OR A=2) - (A>3 AND  A<7)
110 LET X=X+(A>2 AND A<5)-(A>5 AND A<9)
120 RETURN
1000 REM       1
1010 REM    8     2
1020 REM   7  *  3
1030 REM    6     4
1040 REM       5
1050 REM
1060 REM 0 SWITCHES CURSOR ON OR OFF
1070 REM
1080 REM DONT ENTER THESE REMS
1090 REM IF YOU ONLY HAVE 1K
```

Hamlet *ZX81*

With this program the ZX81 takes the place of the infinite number of monkeys with an infinite number of typewriters who will eventually come up with the script of *Hamlet*.

The program generates lines of random letters, but to give things a push in the right direction, the line numbers which print the letters are spread out so that the frequency of individual letters is the same as that in 20th-century English.

(Perhaps the frequencies were different in Elizabethan times?)

The program can become a game by having a competition to see who can spot the most words of three or more letters.

By entering RAND (number) before running, the same letters can be repeated to resolve arguments.

Hamlet
by Phil Garratt

```
1 SCROLL
2 SCROLL
3 SCROLL
4 SCROLL
6 FOR A=1 TO 22
7 GOSUB 10*INT (RND*400+1)
8 NEXT A
9 GOTO 1
320 PRINT "A"
325 RETURN
390 PRINT "B"
395 RETURN
500 PRINT "C"
505 RETURN
660 PRINT "D",
665 RETURN
1100 PRINT "E",
1105 RETURN
1260 PRINT "F",
1265 RETURN
1320 PRINT "G"
1325 RETURN
1560 PRINT "H",
1565 RETURN
1820 PRINT "I"
1825 RETURN
1840 PRINT "J"
1845 RETURN
1860 PRINT "K",
1855 RETURN
2000 PRINT "L"
2005 RETURN
2120 PRINT "M"
2125 RETURN
2400 PRINT "N"
2405 RETURN
2720 PRINT "O"
2725 RETURN
2800 PRINT "P"
2805 RETURN
2810 PRINT "Q"
2815 RETURN
2835 RETURN
3070 PRINT "R"
3075 RETURN
3310 PRINT "S"
3315 RETURN
3670 PRINT "T"
3675 RETURN
3790 PRINT "U"
3795 RETURN
3830 PRINT "V"
3890 PRINT "W"
3895 RETURN
3910 PRINT "X"
3915 RETURN
3990 PRINT "Y"
3995 RETURN
4000 PRINT "Z"
4005 RETURN
```

Road Runner *ZX81*

In this program you are attempting to drive a long line of letter Vs down a twisting, turning track of red hash symbols (shown in this listing as £ signs). Your controls are Z and M which move you left and right respectively.

Line 140 moves the track randomly, making sure that it does not stray off the edge of the screen. Line 150 prints the V, which is scrolled up (as is the track) by lines 220 and 240.

The function reach (X,Y), which starts at line 290, checks the status of the position the V will next occupy and if it finds anything other than a 32 there (32 is a space, see line 200) sends action to the procedure 'end', which starts at line 370.

The one in brackets after INKEY$ in line 250 ensures that the computer waits one fiftieth of a second before proceeding. Line 260 interprets the INKEY$ and by using the logic within each pair of brackets, ensures that the

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V is not allowed to go off either side of the screen

This program uses a REPEAT/UNTIL loop (see lines 130 and 270) to keep it running until the loop is exited by line 200

Note in line 270 it says UNTIL FALSE This means that the loop will continue for ever, unless there is an exit condition within the loop which is satisfied, or the BREAK key is pressed

If you'd like to slow the program down, change the one at the end of the SOUND statement in line 230 into a two or a three, and/or change the one in brackets into two or three in line 250

Road runner
by Tim Hartnell

```
 10 RE [illegible] F [illegible]
 20 RE [illegible] HARTNELL 1982
 30 RE [illegible] M LET YUR BBC MI [illegible]
 40 REM      TEACH YOU T[illegible] PROGRAM
 50 MODE 7
 60 TIME 0
 70 A=10
 80 [illegible]=13
 90 [illegible]
100 FOR J 1 TO 2[illegible]
110 PRINT
120 NEXT J
130 REPEAT
140 A=A+RND 2 [illegible] 1 -RND [illegible]
150 PRINT TAB X-1 Y: CHR$ 1[illegible]
160 L =POS
170 L[illegible] POS
180 Z=FNREADCH[illegible]+1
190 VDU 31 L[illegible] LY
200 IF Z 32 PROCEND
210 PRINT TAB A 2[illegible] CHR$ 129 [illegible] THE [illegible]
215 PRINT "TIME DIV 10: 10 [illegible]
220 PRINT
230 SOUND 0 [illegible]-RND 6 [illegible] 1
240 PRINT
250 C$=INKEY$ 1)
260 [illegible] C$= 2" AND [illegible] L$="M" AND [illegible]
270 UNTIL FALSE
280 REM##########
290 DEF FNREADCH( Y)
300 LOCAL A C
310 VDU 31 Y
320 A =1 5
330 =USR &FFF4
340 L=C AND &FFFF
350 C=C DIV &100
360 =[illegible]
370 DEF PROCEND
380 M TIME [illegible] 10 [illegible]
390 REPEAT
400 PRINT TAB 0 [illegible] CHR$ 129+RND [illegible] END OF RACE [illegible]
410 SOUND 0 -15 RND 12: AND 5
420 SOUND 1 -1[illegible] AND 12 AND 5
430 SOUND 3 -1[illegible] AND [illegible] AND [illegible]
440 UNTIL [illegible]
450 ENDPROC
```

Machine code loader *ZX81*

The program has five functions You can enter one or two bytes of decimal (so full address, eg 16396, can be entered) or 1 byte hex You can print what you've entered so far on to the screen (if the screen fills up then press 'cont'), and run your machine code program

In addition, the address of last byte entered and its decimal contents are displayed at the top of the visual display screen

Machine code loader
by Phil Garratt

```
10 REM
20 LET A=16514
25 CLS
30 PRINT A-1 PEEK (A-1)
40 PRINT "1=1*DEC,2=2*DEC,3=1*HEX"
45 PRINT "4=PRINT,6=RUN"
50 PRINT
60 INPUT B
70 GOTO B*200
400 PRINT B,"*DEC"
410 INPUT C
420 POKE A+1,INT (C/256)
430 POKE A,C-256*PEEK (A+1)
440 LET A=A+B
450 GOTO 25
600 PRINT "1*HEX"
610 INPUT A$
620 POKE A,16*(CODE (A$)-28)+CODE A$(2)-28
630 LET A=A+1
640 GOTO 25
800 CLS
810 FOR C=16514 TO A
820 PRINT C,PEEK C
830 NEXT C
840 INPUT A$
850 GOTO 25
1200 PRINT USR 16514
```

NB Insert 40 graphic spaces after the REM statement in line 10

Snakes alive *Vic*

This program works with an unexpanded Vic You are in control of a moving snake which is contained within the Vic screen The snake is slowly growing, and you have to prevent its head from hitting both the sides of the case and its own tail To score points move the head of the snake over the boxes which appear randomly as the snake is moving

This is a lot more difficult than you might at first think

The snake is controlled by using either asterisk or up-arrow to move vertically and semicolon or equals to move to the left Return and shift are big enough to hit during moments of panic!

It is a fairly simple task to convert the program to work with a joystick — see page 216 of *The Vic Revealed* by Nick Hampshire

Lines 200 to 230 are the ones to change if a joystick is to be used

See page 14 for the listing of *Snakes alive*

Snakes alive

by Dave Middleton

```
10 PRINT"SNAKES ALIVE!
15 CLOSE
20 INPUT"INSTRUCTIONS",Z$:IFASC(Z$)=78GOTO100
30 GOSUB1000
90 GETZ$ IFZ$=""GOTO90
100 DIMP(80) D(3)
110 D(0)=22 D(1)=60 D(2)=62 D(3)=30
120 T9=7680 T6=3599 PRINTCHR$(12)
130 M1=36876 M2=36274 M3=36875
140 PRINT"  SCORE  0"
145 FOR J=38400 TO 38906 POKEJ,2 NEXTJ
150 FORJ=7702 TO 7723  POKEJ,81 POKEJ+462,81 NEXTJ
160 FORJ=7702 TO 8142 STEP22 POKEJ,81 POKEJ+21,81 NEXT
170 V=10 H=11 V1=0 H1=-1 P2=10 D1=1
180 TI$="000000"
190 PRINT" RIGHT$(TI$,2) IFTI>T6GOTO0480
200 GETZ$ IFZ$=""GOTO230
210 IF Z$=CHR$(13)THEN Z=2 D1=2 D=.5 V1=0 H1=1
215 IF Z$=" " OR Z$="="THEN Z=1 D1=1 D=.5 V1=0 H1=-1
220 IF Z$="*" OR Z$="↑"THEN Z=3 D1=3 D=1.5 V1=1 H1=0
230 IF PEEK(653)=1 THEN Z=0 D1=0 D=-1.5 V1=-1 H1=0
235 V=V-V1 H=H+H1
240 P=7680+V*22+H
250 F9=PEEK(P) POKEM1,15 POKEM3,29*D1+128 POKEM2,15
260 R6=R7 R7=R7+1 IFR7>P2THENR7=0
270 P1=P(R7) P(R7)=P POKEM1,0 IFP1<>0THENPOKEP1,32
280 POKEP,D(D1) P1=P(R6) IFP1<>0THENPOKEP1,81
290 IFF9<>32GOTO400
300 IFRND(1)>.05GOTO190
310 FORV3=V2-1TOV2+1 P3=V3*22+T9 FORH3=H2-1TOH2+1 IFPEEK(P3+H3)<>102GOTO330
320 POKEP3+H3,32
330 NEXTH3,V3 T=0 POKEP8,32
340 V2=INT(RND(1)*19)+3 H2=INT(RND(1)*13)+2
350 FORV3=V2-1TOV2+1 P3=V3*22+T9 FORH3=H2-1TOH2+1 IFPEEK(P3+H3)<>32GOTO340
360 NEXTH3,V3 FORV3=V2-1TOV2+1 P3=V3*22+T9 FORH3=H2-1TOH2+1
370 POKEM1,15 POKEM2,170
380 POKEP3+H3,102 POKEM1,0
390 NEXTH3,V3 T=9*RND(1) P8=V2*22+H2+T9 POKEP8,49+T GOTO190
400 IFF9<>102GOTO0460
410 T$=TI$
420 T=T-1 S=S+1 POKEP8,T+49 POKEM1,15 POKEM2,138+T*5
430 PRINT" S
440 FORJ=10UT STEP-1 POKEM3,J NEXT POKEM1,0 IFT>=0GOTO420
450 P2=P2+1 TI$=T$ GOTO310
460 POKEM1,16 POKEM2,15 POKEM3,200 FORJ=1TO1000 NEXT
470 POKEM1,0
480 PRINT"                      ANOTHER GAME    "
490 GETZ$ IFZ$=""GOTO0490
500 IFZ$="Y"THENCLR GOTO100
510 IFZ$<>"N"GOTO490
520 PRINT"" END
1000 PRINT"    SNAKES ALIVE!"
1010 PRINT"GUIDE THE  SNAKE       WITH KEYS "
1030 PRINT"* OR ↑       ●
1040 PRINT"             |
1050 PRINT"             |
1060 PRINT"= OR , ●—    —● (RET)
1070 PRINT"             |"
1080 PRINT"             |"
1090 PRINT"SHIFT        ●
1100 PRINT"..TRY TO HIT THE BOXESFOR POINTS."
1110 PRINT"YOU HAVE 60 SECONDS OFPLAY. GOOD LUCK!"
1120 PRINT" HIT ANY KEY TO START"
1130 RETURN
```

Statistical program *ZX81*
This program written by Ken Mahogany for a 16K ZX81 can easily be broken down into four programs, each of which will fit within 1K of computer memory

To get it into 1K just enter the line numbers from 1000 to 1500, 2000 to 2510, 3000 to 3510 or 4000 to 4100 You'll also have to assign COUNT and TOTAL for each program

The four programs are

Arithmetic mean: this is simply the average of a set of numbers

Geometric mean: the geometric mean is the nth root of the product of the numbers, when n is the total number of numbers entered

Harmonic mean: the harmonic mean is derived from the reciprocals of the entered numbers

Factorial: a factorial is the progression A*(A − 1)*(A − 2)*(A − 3) down to *(2)*(1) where A is the integer entered in line 4030. As this only works with integers line 4040 changes any non-integer entry into an integer

The routine from line 9000 presents a menu of choices. Note the use of GOTO A*1000 in line 9600 This is a shorthand way of saying,

IF A = 1 THEN GOTO 1000
IF A = 2 THEN GOTO 2000
IF A = 3 THEN GOTO 3000
IF A = 4 THEN GOTO 4000

You can often make use of this technique in menu-driven programs

Noughts and Crosses *ZX81*
Here is an elaborate, and extremely hard to beat version of noughts and crosses written for a ZX81 with more than 1K by Graham Charlton

You have the option of going first or second in the game You are the Os, the ZX81 is the Xs

Wait for the board to change before entering your move which you do simply by entering the number (one to nine) of the square into which you want to move

Note how this program makes use of the ZX81's string-slicing ability (for example lines 20 to 40)

Play this game in SLOW mode The program does not say who has won so the game has to be played out completely

See page 18 for the listing of *Noughts and Crosses*

Statistical program
by Ken Mahogany

```
[illegible] REM [illegible] PROGRAM
[illegible] [illegible] MAHOGANY
[illegible]
[illegible] ARITHMETIC MEAN
[illegible] PRINT "ARITHMETIC MEAN
[illegible] PRINT "ENTER THE NUMBERS YOU WISH ME"
[illegible] PRINT TAB 5 "TO AVERAGE FOR YOU"
[illegible] PRINT "ENTER E TO END YOUR INPUT"
[illegible] INPUT Q$
[illegible] IF Q$="E" THEN GOTO 1400
[illegible] PRINT Q$,"
[illegible] LET TOTAL=TOTAL+VAL (Q$)
[illegible] LET COUNT=COUNT+1
[illegible] GOTO 1060
1400 PRINT
1410 PRINT
1500 PRINT "THE ARITHMETIC MEAN IS ";TOTAL/COUNT
1510 GOTO 9000
2000 REM GEOMETRIC MEAN
2010 PRINT "GEOMETRIC MEAN"
[illegible] PRINT "ENTER THE NUMBERS YOU WISH ME
[illegible] PRINT "TO USE TO FIND THE GEOMETRIC MEAN
[illegible] PRINT "ENTER E TO END YOUR INPUT"
[illegible] LET TOTAL=1
[illegible] INPUT Q$
[illegible] IF Q$="E" THEN GOTO 2500
[illegible] PRINT Q$;" ",
[illegible] LET COUNT=COUNT+1
[illegible] LET TOTAL=TOTAL*VAL Q$
[illegible] GOTO 050
[illegible] PRINT
[illegible] PRINT "THE GEOMETRIC MEAN IS ";TOTAL**(1/COUNT)
[illegible] GOTO 9000
[illegible] REM HARMONIC MEAN
[illegible] PRINT "HARMONIC MEAN
[illegible] PRINT "ENTER THE NUMBERS YOU WISH ME"
[illegible] PRINT "TO USE TO FIND THE HARMONIC MEAN"
[illegible] PRINT "ENTER E TO END YOUR INPUT"
[illegible] INPUT Q$
[illegible] IF Q$="E" THEN GOTO 3500
[illegible] PRINT Q$,
[illegible] LET TOTAL=TOTAL+(1/VAL Q$)
[illegible] LET COUNT=COUNT+1
[illegible] GOTO 050
[illegible] PRINT
[illegible] GOTO 9000
[illegible] REM FACTORIAL
[illegible] PRINT "FACTORIAL
[illegible] PRINT "ENTER AN INTEGER
[illegible] INPUT NUM
[illegible] LET NUM=INT (NUM
[illegible] LET A=1
[illegible] FOR B=1 TO NUM
[illegible] LET A=A*B
[illegible] NEXT B
[illegible] PRINT
[illegible] PRINT "THE FACTORIAL OF ";NUM;" IS ";A
[illegible] GOTO 9000
[illegible] STOP
[illegible] PRINT
[illegible] PRINT "SELECT THE PROGRAM YOU WANT
[illegible] PRINT "1 - ARITHMETIC MEAN"
[illegible] PRINT "2 - GEOMETRIC MEAN"
[illegible] PRINT "[illegible] - HARMONIC MEAN"
[illegible] PRINT "4 - FACTORIAL
[illegible] PRINT "[illegible] TO END
[illegible] INPUT A
[illegible] IF A[illegible] OR A[illegible]5 THEN GOTO 9050
[illegible] IF A=5 THEN STOP
[illegible] CLS
[illegible] LET TOTAL=0
[illegible] LET COUNT 0
[illegible] PRINT
[illegible] GOTO A*1000
```



Noughts and crosses
by Graham Charlton

```
10 GOTO 1000
20 PRINT AT 3,11,A$(1 TO 11)
30 PRINT AT 7,11 A$(13 TO 23)
40 PRINT AT 11,11 A$(25 TO 34)
50 RETURN
60 GOSUB 20
70 IF D=9 THEN GOTO 1000
80 IF D=3 AND (A(1)=1 AND A(9)=1 OR A(3)=1 AND A(7)=1)
   THEN LET B$=C$
90 LET D=D+1
95 FOR E=-2 TO 2 STEP 4
100 FOR A=1 TO 3
110 IF A(A*3-2)+A(A*3-1)+A(A*3)=E THEN GOTO 190
120 IF A(A)+A(A+3)+A(A+6)=E THEN GOTO 210
130 NEXT A
140 IF A(1)+A(5)+A(9)=E THEN GOTO 230
150 IF A(3)+A(5)+A(7)=E THEN GOTO 250
155 NEXT E
160 FOR C=1 TO 9
165 LET B=VAL B$(C)
170 IF A(B)=0 THEN GOTO 260
180 NEXT C
190 LET B=(A*3-2)*(NOT A(A*3-2) +(A*3-1)*(NOT A(A*3-1))
   +(A*3)*(NOT A(A*3))
200 GOTO 260
210 LET B=A*(NOT A(A))+(A+3)*(NOT A(A+3))+(A+6)*(NOT A(
   A+6))
220 GOTO 260
230 LET B=(NOT A(1))+5*(NOT A(5))+9*(NOT A(9))
240 GOTO 260
250 LET B=3*(NOT A(3))+5*(NOT A(5))+7*(NOT A(7))
260 LET A$(B*4-2)="X"
270 LET A(B)=-1
280 GOSUB 20
290 IF D=9 THEN GOTO 1000
300 LET Z$=INKEY$
310 IF Z$="" THEN GOTO 300
320 LET A$(VAL Z$*4-2)="0"
330 LET A(VAL Z$)=1
340 LET D=D+1
350 GOTO 60
1000 LET A$=" 1 # 2 # 3 # 4 # 5 # 6 # 7 # 8 # 9"
1010 LET B$="573914826"
1020 IF RND<.2 THEN LET B$="159370246"
1030 LET C$="431978625"
1040 DIM A(9)
1050 PRINT AT 16,2,"DO YOU WANT TO GO FIRST? (Y/N)"
1060 LET Y$=INKEY$
1070 IF Y$="" THEN GOTO 1060
1080 PRINT AT 16,2,"
1090 FOR A=1 TO 6
1100 PRINT AT A*2,11,"    #   #"
1110 NEXT A
1120 PRINT AT 5,11 "###########"
1130 PRINT AT 9,11,"###########"
1140 LET D=0
1150 IF Y$="Y" THEN GOTO 280
1160 GOTO 60
```

NB The hash sign (#) signifies a graphic space

Poetry — *Vic*

This program was written for an unexpanded Vic, but there should be no problem in translating it to work with any other machine. Here are a few examples of the sort of poetry it produces:

Molten, flashing
Fiercely splendidly burning
Courageously flashing, splendidly strident

Ingots drift courageously
Splendidly flashing

Machines yearn
Glowing devices
Molten tractors yearn

Home accounts — *BBC*

This is a fairly simple, but very useful personal accounts program. When you first RUN it, you'll see that the balance is zero.

You can work out a series of accounts by using GOTO 70 instead of RUN, to keep the 'previous balance (variable B) intact.

Note that the Centronics printer has turned all the pound signs into a single apostrophe ('). Enter these as pound signs.

The program is set up to deal with six categories — cheques, credit cards, rates, mortgage, standing orders, and monies in — as well as a seventh, salary earned, but can easily be modified to handle as many categories as you like.

To handle more categories simply change the six in line 40 (M = 6) to the number of categories you need. As well as this, you'll have to add additional data in the ON F GOSUB line line 180 so the computer will have extra destinations for additional categories. You do this by adding the categories before the start of the initialisation procedure (line 400).

Note that 'monies in' are recorded as negative numbers and will be shown as such in the display.

It would be very easy to modify this program to give you the option of dumping the accounts on to a printer. The modification should be entered between lines 210 and 220.

Note the use of the GET function in line 540 to stop the program until any key is pressed.

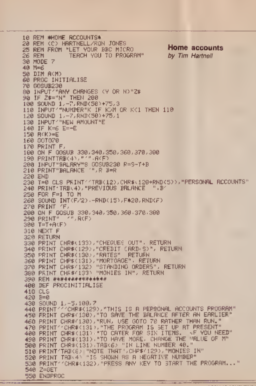
See page 18 for the full listing of *Home accounts*.

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Poetry

by Jim Butterfield

```
100 PRINT"▮POETRY       JIM BUTTERFIELD"
120 INPUT"▮INSTRUCTIONS Y/N",Z$
130 IFASC(Z$)=78GOTO300
140 PRINT"▮THIS FROGRAM WRITES POEMS..."
150 PRINT"▮YOU CAN CHANGE IT TO  WPITE POEMS",
160 PRINT" OF YOUR   CHOICE BY CHANGING THELIST",
170 PRINT" OF WORDS .. FOUNDIN DATA STATEMENTS",
180 PRINT"    FROM 300 TO 400.  YOU CAN ALSO CHANGE".
190 PRINT" THE   LINE STRUCTURE.▮"
200 PRINT"JUST PUT IN THE TYPE  OF WORDS THAT",
210 PRINT" SUIT THETYPE OF POEM YOU WANT..."
220 PRINT"FOR SCENIC POEMS -    'HILLS,FIELDS,TREES.."
230 PRINT"ROMANTIC - 'LIPS,EYES,SOFT.LOVELY.."
240 PRINT"MOODS - DAFK,BROODING,GRIM,.."
250 PRINT"DO YOUR OWN TNING..."
260 PRINT"   ...START BY HITTINGANY KEY."
270 GET Z$ IFZ$=""GOTO270
295 DATA TRANSISTORS.CIRCUITS,TRACTORS
300 DATA MACHINES,COMPUTERS,FACTORIES,DEVICES,NAMMERS,INGOTS,RIVETS,N
310 REM ABOVE WAS THEME NOUNS
320 DATA YEARN.PINE WAIT,DREAM,FLOAT,GLISTEN,DRIFT,V
330 REM ABOVE WAS THEME VERBS
340 DATA MOLTEN GLOWING,BURNING,STRIDENT,BRIGHT,FLASHING,J
350 REM ABOVE WAS THEME ADJECTIVES
360 DATA BRAVELY,FIERCELY,MADLY,COURAGEOUSLY,ECSTATICALLY,SPLENDIDLY,A
370 REM ABOVE WAS THEME ADVERBS
380 DATA *,N! NV,NVA.JN,JJN,"J,J",NVA,AJ,AAJ,"AJ,AJ",JNV,JNVA,"NV,NV","$"
390 REM ABOVE WAS LINE STRUCTURES
450 T=TI
460 T=T/1000 J=INT(-T) IFT>=1GOTO460
500 DIMA$(100),K$(6),E(6)
510 C=0 N=0 E(0)=1
520 READA$
530 IFA$="$"GOTO560
540 IFLEN(A$)>1ORP$="*"THENN=N+1 A$(N)=A$ GOTO520
550 C=C+1 E(C)=N+1 K$(C)=A$ P$=A$ GOTO520
560 T=N-E(C-1)
570 PRINT"▮▮" L=INT(RND(1)*5)+3
600 FOR LI=ITOL
610 S=INT(RND(1)*T)+E(C-1)
620 S$=A$(S)
630 FORJ=1TOLEN(S$)
640 K$=MID$(S$,J,1)
650 FORK=ITOC-1 IFK$=K$(K)GOTO800
655 NEXTK PRINTK$,
660 NEXTJ PRINT
680 NEXTLI
690 GETZ$ IFZ$<>""GOTO690
700 T2=TI+1200 PRINT"▮▮▮ ANOTHER POEM? ▮",
710 GETZ$ IFZ$<>""GOTO730
720 Z$="Y" IFT2>TIGOTO710
730 IFASC(Z$)<>78GOTO570
740 END
800 S=INT(RND(1)*(E(K)-E(K-1)))+E(K-1)
810 PRINT" ",A$(S). GOTO660
```



Home accounts

by Tim Hartnell

```
10 REM *HOME ACCOUNTS*
20 REM (C) HARTNELL/RON JONES
25 REM FROM "LET YOUR BBC MICRO
26 REM        TEACH YOU TO PROGRAM"
30 MODE 7
40 M=6
50 DIM A(M)
60 PROC INITIALISE
70 GOSUB230
80 INPUT'"ANY CHANGES (Y OR N)"Z$
90 IF Z$="N" THEN 200
100 SOUND 1,-7,RND(50)+75,3
110 INPUT'"NUMBER"K IF K>M OR K<1 THEN 110
120 SOUND 1,-7,RND(50)+75,1
130 INPUT'"NEW AMOUNT"E
140 IF K=6 E=-E
150 A(K)=E
160 GOTO70
170 PRINT F,
180 ON F GOSUB 330,340,350,360,370,380
190 PRINTTAB(4),"'",A(F)
200 INPUT"SALARY"S GOSUB230 R=S-T+B
210 PRINT"BALANCE '",R B=R
220 END
230 T=0 CLS PRINT''TAB(12),CHR$(128+RND(5)),"PERSONAL ACCOUNTS"
240 PRINT'TAB(4),"PREVIOUS BALANCE  ",B'
250 FOR F=1 TO M
260 SOUND INT(F/2),-RND(15),F*20,RND(F)
270 PRINT 'F,
280 ON F GOSUB 330,340,350,360,370,380
290 PRINT"  '",A(F)
300 T=T+A(F)
310 NEXT F
320 RETURN
330 PRINT CHR$(133),"CHEQUES OUT", RETURN
340 PRINT CHR$(129),"CREDIT CARD(S)", RETURN
350 PRINT CHR$(130),"RATES"  RETURN
360 PRINT CHR$(131),"MORTGAGE", RETURN
370 PRINT CHR$(132) "STANDING ORDERS", RETURN
380 PRINT CHR$(133) "MONIES IN", RETURN
390 REM ***************
400 DEF PROCINITIALISE
410 CLS
420 B=0
430 SOUND 1,-5,100,7
440 PRINT'''CHR$(129),"THIS IS A PERSONAL ACCOUNTS PROGRAM"
450 PRINT CHR$(130),"TO SAVE THE BALANCE AFTER AN EARLIER"
460 PRINT CHR$(130),"RUN, USE GOTO 70 RATHER THAN RUN."
470 PRINT''CHR$(131),"THE PROGRAM IS SET UP AT PRESENT"
480 PRINT CHR$(131),"TO CATER FOR SIX ITEMS.  IF YOU NEED"
490 PRINT CHR$(131),"TO HAVE MORE, CHANGE THE VALUE OF M"
500 PRINT CHR$(131),TAB(6) "IN LINE NUMBER 40."
510 PRINT'TAB(8) "NOTE THAT',CHR$(129),"MONIES IN"
520 PRINT TAB(4) "IS SHOWN AS A NEGATIVE NUMBER"
530 PRINT''CHR$(132),"PRESS ANY KEY TO START THE PROGRAM..."
540 Z=GET
550 ENDPROC
```

Sound & vision

This machine's a dedicated musician

The Roland TR-808 is a dedicated microcomputer It s sole purpose in life is to make rhythms As a computer it is 'user-friendly — that s to say using it is quiet easy As a drum machine it is totally flexible, almost any rhythm pattern you could ever want can be programmed A single pattern up to 768 measures long is possible

There are nominally 11 different instrument sounds plus an accent all of which can be located at any point within a bar or measure I say 'nominally because although only 11 different sounds can be used in any one program, five of the sounds can be switched to produce alternative sounds In normal synthesiser nomenclature these sounds would be referred to as 'voices

Some of the parameters of some of the voices can be altered to suit individual taste All of the voices have separate volume controls

Looking at the voices from left to right, you come first to the accent voice This isn t really a voice at all When it is used it gives an emphasis to any other voice programmed on the same step The level of volume control sets the amount of emphasis to be given

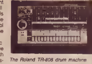
The drum voices are very realistic and not at all dry At the rear of the machine is an output jack for each individual voice They enable professional users to individually treat each voice before sending it to a mixing desk

In addition there are two jacks that provide a mixed output the levels being set by the volume control for each voice

The individual outputs are not affected by the level controls but when a jack plug is inserted into an individual voice output, that voice is deleted from the main mix

You can set the tone and decay of the bass drum to virtually any level I find the bass voice to be a little 'heavy' and so I use it only sparingly

The snare drum also has a tone control and a snappy control 'Snappy controls the amount of noise present in the sound and can give the impression that the drum is being tightened up


The Roland TR-808 drum machine

There are three tom-toms, which double as congas to give that funky Latin sound

Rim shot doubles up with claves Used sparingly claves can add an authentic salsa feel to a rhythm making any material pretty fashionable with minimum trouble Rim shot is just right for reggae sounds

Handclap, cowbell and three different types of cymbal voice are also available

Like all the kit in the Roland range, the TR-808 is easily interfaced with other instruments **Sam Blythe**

Micro art makes sense of the world

This is the first of a regular series of columns about the use of microcomputers, and especially the gradually-appearing BBC machine, in what are arguably the most important areas of use of small computers art and design

Art because it gives a certain freedom and licence to explore questions which might be a bit out-of-the-ordinary, and design because the *design* of the information environment and the use of the computer to present information visually must be the main ways in which we shall change and make sense of our complex world

This is not to say that political action art or anything else should only be done on a computer but we can learn so much about ourselves and our problems using even a cheap micro plugged into a television

To those of you who already have BBC machines a piece of advice the forthcoming manual will contain much


Artists meet the micro s challenge

of interest in terms of re-assigning certain jobs to certain keys

But in my (pre-release and therefore subject-to-change) version, some of the tricks are clearly designed for a different operating system Those with early machines watch out!

As a test try this a facility that causes the red user-defined keys along the top of the keyboard to have their normal function disabled and to generate Ascii codes — any code!

The command *FX230 followed by a comma and a number sets the 'base value — key f0, the leftmost of the red keys — to the number the rest then follow suit

Thus *FX230 129 causes the function keys to produce Ascii codes of 129 to 138 — and from 145 to 154 if they are 'shifted', which adds on 16.

It is probably no coincidence that this effect using 129 as above (the example is theirs) gives all the keys you need for Mode 7 Teletext graphics such as cyan text blue graphics, flashing, and so on

(Do not despair if this doesn t work on your machine Doubtless all will be put right)

Finally (and again possibly not on all machines) *FX241 changes the sound channel used by the 'bell' (or bleeper) and *FX243 alters the pitch A combination of channel 0 (noise) and a weird pitch should make the thing belch at you instead of merrily squeaking Such things are always a pleasure **Brian Reffin Smith**

Step right inside for the electronic striptease!

John Gowrie explains how 'simple' calculators hide fascinating mysteries

AS FAR as I know, nobody has ever said 'A pocket calculator is all things to all men.' But it would have been quite appropriate if they had.

Programmable calculators, in particular, are similar to a Russian doll which you can open to reveal a smaller doll which itself contains a smaller doll and so on.

With calculators too a myriad of deeper and deeper levels of complexity lurks beneath the surface.

The fundamental interest to the user lies in adjusting to the logic of writing programs which actually calculate what they are meant to and mastering all of the information in the owner's handbook.

The latter is not always easy. Some handbooks contain examples of the worst English in print.

The next level of interest comes in moulding your programs to suit the particular brand of calculator you are using. For instance, one of the most frequently used commands in programming is the GOTO which transfers the program pointer from one line to another which has been specified.

The sky is the limit

If you own a Casio calculator, you can show that as soon as a GOTO is encountered a search takes place backwards in the program line by line.

If the relevant line is not encountered before the beginning of the program then the search continues forwards from the original line. Although all these operations are performed in fractions of a second, they can involve quite a time delay in a long program.

Other calculator manufacturers have different looping procedures. Efficient and fast programming can also be effected by judicious placing of subroutines in the memory stack.

The software complexity appears even deeper once you recognise that the calculator handbook does not define the boundary conditions of the calculator. In fact so much more than what is described in the handbook is possible with most calculators that the sky really is the limit.

Remember that the brain of your calculator — the microchip — is an incredibly intricate network equivalent to tens of thousands of components. The expense involved in designing one type of chip means that it is not unusual for a whole range of calculators to have inside them the same basic chip.

Don't be surprised if a cheap £20 calculator uses a chip found in more expensive models. Not many Casio fx-81 owners know that they can do standard deviations on their machine although there is no mention of this in the handbook or on the keyboard.

Mistakes can help

The intricacy of the chip means that occasionally mistakes are made in its design. Occasionally the mistake simply allows the user to put the calculator into a non-standard but fairly useful condition.

For example, take a good old HP-45 from the shelf of your calculator museum and dust it off; press RCL and then simultaneously the three keys CHS, 7 and 8. If you get your fingering right, you might be surprised to see that the calculator has become an electronic stop-watch.

Similarly, it is possible to put the display of an HP-41C in a confused state with the following small program:

```
01♦LBL ABCSTOR
02  FILL DISPLAY
03 AVIEW
04 SF 25
05 SF 99
06♦LBL 99
07  DELAY LOOP
08 GTO 99
```

The deepest level of software complexity probably lies in the ability to communicate with the calculator in its own language of binary bits and bytes and to access various registers and flags which are normally hidden to the user — often with good reason. It is possible to make a calculator 'crash' while doing the latter.

At this level it is the chip mistake, or 'software bug' in the jargon, which can be very handy indeed. It appears that most of the top-range calculators have some chink in their armour which lets one see the internal architecture.

If you have any examples of this, write in and tell us about them.

It is sometimes possible to create any binary code you wish in program memory, and consequently increase the instruction set of the device.

For instance, a software bug in the HP-41C permits one to put data memory bytes into program memory and then perform editing to produce any combination of bytes.

This can be done with the *Byte Jumper*, which goes like this.

1. Clear the entire program memory by switching the calculator on while the CLR key is depressed.
2. Assign • to X≤Y? and Σ+ to Σ+.
3. Enter CHS into the program memory.
4. Still in program mode press, in rapid succession, CAT1 and R/S.
5. Press ALPHA and the correction key.
6. The CHS function should now be in line 4094.
7 BST to line 4087.
8. Press the correction key twice.
9. Enter the text line TA.
10. Press GTO.
11. Press Σ+: this function XROM 05,01 is the 'byte jumper' and if used properly it can really expand the utility of the machine.

Again, if you have any pertinent examples from other devices, don't be afraid to let us know.

On the hardware side, it is possible to hook some of the really fancy calculators up to much larger mainframe computers through standard interfacing devices.

Even this level of complexity isn't quite enough for the hardy souls who like to open up the insides of their calculator and probe around with an oscilloscope and voltmeter.

Once you have unravelled the various data buses and timing requirements of all the signals then you're in the position to do your own interfacing.

Competition

There is a prize of £5 for the reader who sends in the most intriguing program to calculate 5000! Remember that $X! = X(X-1)(X-2) \ldots 1$. How does it compare with the tables and why is it different?

Programming

How to load machine code into a ZX81

There are three tools which are essential for machine code programming — an editor/loader, an assembler and a disassembler. The most important of these is probably the editor/loader, because this makes it easier to enter the hexadecimal values of a hand-assembled machine code program into memory.

Because the ZX81 is designed to run Basic programs the main use of machine code routines is to enhance the speed and flexibility of a Basic program.

If the machine code routines are short, they are easily stored in the text area following an REM statement in the Basic program. This entails setting up a dummy REM statement followed by a number of characters. Always use the same character, such as A.

The number of characters used should be equal to the bytes in the machine code routine. The editor is then used to find the program line and replace the characters in the REM statement with the bytes of the machine code program.

You can use the editor/loader to find the start address of the REM statement — look for the REM command token hex EA followed by a series of values equal to the Ascii code of the character used in the REM statement.

Load the editor program into the computer and use it to put the machine code bytes into the REM statements — it's a good idea to store these in the first lines of the program.

Having created these special REM statements containing the machine code routines, delete the rest of the editor program and write the program which is to use the machine code routines.

You can also use the editor program to look at the monitor or a machine code program — it's great fun trying to work out what the machine code does and how it does it.

The editor program comprises three main routines to convert decimal numbers to hexadecimal numbers and vice versa. This is important because it's far easier to write a machine code program using hexadecimal numbers rather than decimals, particularly when you are calculating jump addresses and double precision numbers on an eight-bit machine.

First the program requests the address of the first location in memory which you wish to examine. The contents of this location are displayed as a hex value preceded by the memory address in both decimal and hex.

To examine following memory locations press F. If you want to step back to the previous memory location press B. To enter the machine code program into memory or to change a byte, step forwards or backwards through memory until the pointer is against the required location, then press R and enter the two hexadecimal characters. This will replace the contents of that location with the new value entered in hex format.

Be very careful whenever you are altering memory locations because it's easy to corrupt the program by changing a program byte which is not part of a REM statement. ■

```
100 REM [illegible] FINE
110 PRINT [illegible] "THAT [illegible]
[illegible] INPUT
[illegible] LET [illegible]
[illegible] LET [illegible]
[illegible] ADDRESS [illegible]
[illegible] DECIMAL HE[illegible] TE
[illegible]
[illegible] HE BYTE CONVERSION
[illegible]
[illegible] BYTE CONVERSION
[illegible] LET H[illegible]CODE F$[illegible]28
[illegible] LET L[illegible]CODE F$[illegible]28
350 LET [illegible]
360 RETURN
400 REM [illegible] COMMAND HANDLIN[illegible]
410 IF INKE[illegible] THEN GOTO 410
411 IF [illegible] THEN GOTO 411
420 IF INKE[illegible] THEN GOTO [illegible]
430 IF INKE[illegible] THEN GOTO [illegible]
440 IF INKE[illegible] THEN GOTO [illegible]
460 IF INKE[illegible] THEN STOP
490 GOTO 400
500 REM STEP [illegible]
510 LET [illegible] 1
520 LET [illegible]
530 RETURN
600 REM STEP FORWARD
610 LET [illegible]+1
620 LET L[illegible]
630 RETURN
700 REM REPLACE
710 IF INKE[illegible] THEN GOTO 710
720 IF INKE[illegible] THEN GOTO 720
[illegible] LET [illegible]
[illegible] IF INKE[illegible] THEN GOTO 740
[illegible] IF INKE[illegible] THEN GOTO [illegible]
[illegible] LET [illegible]
[illegible] LET [illegible]
[illegible] PRINT AT L[illegible] TAB [illegible]
[illegible] POKE [illegible]
[illegible] LET [illegible]-1
[illegible] LET [illegible]
[illegible] RETURN
1000 REM DECIMAL [illegible] HE[illegible] ADDRE[illegible]
1010 LET [illegible]
1020 LET [illegible]
1030 LET [illegible]
1040 LET [illegible]
[illegible] LET [illegible]
[illegible] RETURN
1100 PRINT AT LN [illegible]
1110 PRINT AT L[illegible]
1120 PRINT AT L[illegible] TAB [illegible] TAB [illegible]
[illegible] RETURN
```

The Basic editor/loader allows you to enter hex values into memory

Peek & poke

Peek your technical queries to Graham Charlton. He will poke back an answer

Matter of interest

Philip Grayson of Fetter Road Gateshead writes

Q For a school project, I need to be able to work out how much you have to pay on a loan, when the amount involved the interest rate, and so on changes. It struck me it would be a perfect opportunity to do something worthwhile with my ZX81 — not to say much less work

However, I have come up against a brick wall in trying to devise a suitable program, and I certainly can't work out how to convert the formula given at school into a program which works Could you suggest a way out of the dilemma?

A Unfortunately, you did not include with your question any information on the actual formula you use at school However, I think I know the one which you would have been given, and have worked out the following short program which should prove useful to you

```
10 PRINT "INPUT AMOUNT"
20 INPUT A
30 PRINT "INPUT INTEREST
   RATE"
40 INPUT IR
50 LET IR=IR/100
60 PRINT "INPUT LENGTH OF
   LOAN IN YEARS"
70 INPUT Y
80 LET Y=12*Y
90 CLS
100 LET
   B=A*(IR/12)/(1-(1+(IR/12))
   **-Y)
110 LET B=INT (B*100+.5)/100
120 PRINT "THE MONTHLY
   PAYMENT IS £";B
130 PAUSE 4E4
140 CLS
150 RUN
```

This will run on most computers which use Basic Line 130 which is an idea from Trevor Toms book *The ZX81 Pocket Book* simply holds the display for as long as you like until a key is pressed The computer then starts again

Save me!

Martin Davidson of Carlins Lane Norwich writes

Q I have had a ZX81 for some time now and despite carefully trying to follow the instructions in the manual, have a great deal of trouble with LOADing and SAVEing I have tried three different tape recorders, and have run one of them on batteries and from the mains Whatever I do does not seem to improve things Can you suggest a way of improving the load/save reliability of my ZX81 or do you think that I have a defective computer and should send it back to Sinclair?

A LOAD/SAVE problems with the ZX81 are very common so it is unlikely that your computer is defective It is more likely that you are doing something wrong in the process I suggest you try the following

○ Always clean the heads before loading and saving
○ Use computer quality tapes, preferably C-12s
○ Make sure the leads from the tape recorder to the ZX81 do not cross the lead to the power supply unit
○ It may sound silly, but it is very easy to plug the leads into the wrong holes so make sure you have them in correctly
○ Write a short three-line program and save it then — after NEWing the ZX81 — attempt to load it back, trying over and over again with slightly different volume settings until you achieve a load Mark this spot perhaps with a small paper arrow and always set the recorder to this point in future

Getting the point

Carey Thurley of Diamond Road Inverness writes

Q I am writing a game for my BBC Microcomputer, in Mode 7 in which it is necessary for me to check whether a particular position on the screen is blank or not I can't understand the manual well enough yet to find out how to do this All I know is that the POINT command does not seem to work for me What do you suggest?

A POINT, which you can use to find out the colour of a certain position, is designed to work in the graphics modes, not Mode 7, which is the teletext mode Assuming that X is the co-ordinate of the point you wish to check across, and Y is the vertical co-ordinate, use

```
IF ?(HIMEM+X+40*Y)=
ASC("*") THEN
```

This will do whatever follows the THEN, assuming that you are checking to see if there is an asterisk at this point

Light in the dark

Roger Bexley of Jacksons Avenue Sunderland writes

Q When I first got my ZX printer it printed really dark but lately I've noticed it seems to be not nearly as clear Has my printer worn out already — I've only had it a few months — or is something else wrong?

A It could well be that you got one of the early printers which were supplied with what appears to be a superior kind of paper Later when you bought extra rolls from Clive, you were supplied the paper which now seems to be standard and which is not as good — in my opinion — as the original stuff I've found that the replacement rolls do not print as heavily or as clearly as the original roll which was on my ZX computer

Money makers

D C Francis of Cedar Heights Coventry writes

Q My friend and I have written a number of programs — games and some more serious ones — for the ZX81, and want to know if there is a simple way to turn them into money! Is there an easy way to market the programs either as listings or on cassette? And what is the copyright position? If you think we could sell them how much should we charge? And where should we advertise?

A If your programs are both original and well-written you should have little difficulty making some income from them The simplest way to do this is to submit them — in both listing and recorded form — to the major ZX81 software suppliers, such as Bug Byte, Artic and Macronics and see if the programs are good enough for them to sell, on a royalty basis, for you Only submit them to one firm at a time

Alternatively if you have enough listings and can write a brief explanation of what each program does and how it works you could turn them into a book Publishers are hungry for ZX81 manuscripts at the moment and you may well find a ready market there

The third way to sell software is to place your own ads in the computer magazines, and supply the software on cassette The price you charge depends on the quality of the programs, but should be in the range £4.00 to £15.00

Easy conversion

Walter Coles of Western Drive Lugton writes

Q I have a number of books of computer programs which I want to convert to run on my ZX81, and I've noticed that several of them use ON ... GOTO which, as you probably know, is not available on the ZX81 Is there a way of doing this?

A There is a simple way to emulate the ON ... GOTO statement which takes advantage of the way the ZX81 logic works To convert the following line

```
ON J GOTO 100 290 340 270
```

enter this into your ZX81

```
GOTO (100 AND J=1)+(290 AND
   J=2)+(340 AND J=3)+(270
   AND J=4)
```

Another way is to rewrite the program so you can for example, use GOTO 100*J

The simplest way but one which makes for long, untidy programs is to use a series of IF THENs as follows

```
IF J=1 THEN GOTO 100
IF J=2 THEN GOTO 290
IF J=3 THEN GOTO 340
IF J=4 THEN GOTO 270
```

Send your questions to Peek & poke *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF

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Competitions

1 Your chance to win a ZX81 printer!

Each week we plan to give away a valuable piece of hardware as a prize for the best program written by you, the readers, on a theme set by us

The program must be no longer than 100 lines and be suitable for the Vic 20 the ZX81 or the BBC Micro

Your entry should be accompanied by an explanation of the function and use of the program and also of how you went about writing it

The winner will be the reader who in the opinion of the Editor of *Popular Computing Weekly* has sent in the most original and inventive program.

In all cases his decision is final

From time to time we will also publish programs which do not win the competition, but which we think are interesting to other readers

If that happens we will pay the usual rate for contributions to the magazine.

This week's fantastic prize is a ZX81 printer and the theme for the competition is **20,000 Leagues Under the Sea**

Send your program to The Editor, *Popular Computing Weekly*, 19 Whitcomb Street London WC1

Please mark your entry Hardware Competition 1 — and remember your entry must reach us by first post Monday May 3, 1982

2 Complete the crossword and win £10!

ACROSS

6 Characterless computer product that is seen on 7D (7,6)
8 Upset a thousand and one — very loudly (4)
9 Fill up with gas — in half the fifth replaces the sixth (8)
11 Note to take the top off love people (6)
12 Continue to enthuse for artist beginning fifth period (4,2)
13 Cowboy gets a hug with mixed company (6)
14 See 5D
16 Miss start of lap metro ride — see run of a faster engine (8,5)

DOWN

1 Trail back — then multiplies PI by artificial sub-string (7)
2 Moving space I lift and handle roughly (10)
3 Sound of foolish deception leads to strike — it's what *Popular Computing Weekly*'s all about (7,4)
4 Trying place for 3D with care for a cad (11)
5 and 14A Displace under weight of a dreadnaught (7)
7 Upper-class companions make a 100 for a micro (10)
10 Lizard track
15 A hundred up raised in a computer (1,1,1)

3 Solve the puzzle and sneak some software!

The students of our local technical college were engaged in making small containers from 10-inch square sheets of tinplate

As shown in the diagram, they were required to cut from the tinplate the four square corner pieces. The metal was then to be bent up along the lines indicated by the dots, and the edges soldered to make tanks

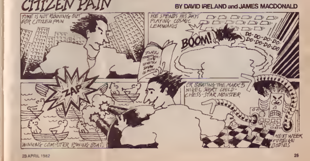
Of course, if the size of the corner pieces were very small then the resulting tank would resemble a shallow tray, and conversely if they were large then the tank would be tall and thin

What sized corner pieces should the students cut for the volume to be as large as possible? ■

The winners for both our crossword and our puzzle will be the two people whose names are drawn first out of the hat in each case

Closing date for both competitions is the Monday three weeks after the date on the cover. Please mark your entry 'CROSSWORD' or 'PUZZLE'

The prize for the crossword and for the puzzle is a £10 gift voucher which is being given by *Popular Computing Weekly* in conjunction with W H Smith





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	Power Supply	[illegible]	
		TOTAL	

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